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10/047,992

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EXAMINER

TALBOT, BRIAN K

ART UNIT

PAPER NUMBER

1792

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DELIVERY MODE

06/29/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |                                      |                                      |  |
|------------------------------|--------------------------------------|--------------------------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/047,992 | <b>Applicant(s)</b><br>OHASHI ET AL. |  |
|                              | <b>Examiner</b><br>Brian K. Talbot   | <b>Art Unit</b><br>1792              |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 4/16/09 (RCE).
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,7,8,11,17,18 and 51-56 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,7,8,11,17,18 and 51-56 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 4/16/09 has been entered.

2. Claims 2-6,9,10,12-16 and 19-50 have been canceled. Claims 1,7,8,11,17,18 and 51-56 remain in the application.

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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5. In light of the amendment filed 4/16/09, the rejection including reference to Kudoh et al. (4,656,048) have been withdrawn as well as the reference to Tseng et al. (6,309,711). However, the following rejections have been necessitated by the amendment.

***Claim Rejections - 35 USC § 103***

6. Claims 1 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sterett et al. (5,746,844) in combination with JP 10-226,803.

Sterett et al. (5,746,844) teaches a method and apparatus for creating a three dimensional article using a layer-by-layer deposition of molten metal and annealing. The molten metal is applied by depositing the droplets in a predetermined pattern and rate (abstract). Sterett et al. (5,746,844) teaches the droplets can overlap one another to form a three dimensional product (Fig. 2 and col. 15 lines 1-19).

Sterett et al. (5,746,844) fails to teach measuring and comparing data that was set in the machine and not calculated by a monitoring device to control the deposited material.

JP 10-226,803 teaches a three dimensional body formed by various kinds of materials. Molten metal is spouted from a nozzle (10) to form droplets (20) that are applied to a substrate to form electric circuits (abstract). JP 10-226,803 teaches that the three dimensional data can be set in a storing means (60) or calculated and then compared to the monitored three dimensional data and adjusted to the desired values ([0010]-[0011])

Therefore it would have been obvious for one skilled in the art at the time the invention was made to have modified Sterett et al. (5,746,844) deposition process by incorporating a

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measuring/control system with data set in the machine (storing device) as evidenced by JP 10-226,803 to produce the desired circuit pattern.

Claims 1 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 10-226,803 alone or JP 10-226,803 in combination with Orme-Marmerelis et al. (6,520,402) both further in combination with Sterett et al. (5,746,844).

Orme-Marmerelis et al. (6,520,402) teaches a high speed direct writing with metallic microspheres. Small droplets of molten metal are generated toward a substrate to form conductive traces (abstract).

JP 10-226,803 teaches a three dimensional body formed by various kinds of materials. Molten metal is spouted from a nozzle (10) to form droplets (20) that are applied to a substrate to form electric circuits (abstract). JP 10-226,803 teaches that the three dimensional data can be set in a storing means (60) or calculated and then compared to the monitored three dimensional data and adjusted to the desired values ([0010]-[0011]).

JP 10-226,803 alone or JP 10-226,803 in combination with Orme-Marmerelis et al. (6,520,402) fail to disclosed the molten metal grains overlapping one another.

Features detailed above concerning the teaching of Sterett et al. (5,746,844) are incorporated here.

Therefore it would have been obvious for one skilled in the art at the time the invention was made to have modified JP 10-226,803 alone or JP 10-226,803 in combination with Orme-Marmerelis et al. (6,520,402) process by applying the molten metal material to be in overlapping

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fashion as evidenced by Sterett et al. (5,746,844) with the expectation of achieving the similar results, i.e. a conductive circuit.

Claims 7,8,17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over (a) JP 10-226,803 in combination with Sterett et al. (5,746,844) or (b) Orme-Marmerelis et al. (6,520,402) in combination with Sterett et al. (5,746,844) further in combination with JP 10-226,803 both (a) and (b) further in combination with Pan (6,501,663).

Features described above concerning (a) JP 10-226,803 in combination with Sterett et al. (5,746,844) or (b) Orme-Marmerelis et al. (6,520,402) in combination with Sterett et al. (5,746,844) further in combination with JP 10-226,803 are incorporated here.

(a) JP 10-226,803 in combination with Sterett et al. (5,746,844) or (b) Orme-Marmerelis et al. (6,520,402) in combination with Sterett et al. (5,746,844) further in combination with JP 10-226,803 fail to specifically teach forming an insulating layer atop the molten layer.

Pan (6,501,663) teaches a three dimensional interconnect whereby an interconnect is covered with an insulator layer to protect the interconnect (abstract and Figs 5-7).

Therefore it would have been obvious for one skilled in the art at the time the invention was made to have modified (a) JP 10-226,803 in combination with Sterett et al. (5,746,844) or (b) Orme-Marmerelis et al. (6,520,402) in combination with Sterett et al. (5,746,844) further in combination with JP 10-226,803 by incorporating an insulator layer atop the molten metal circuit layer as evidenced by Pan (6,501,663) with the expectation of achieving a multilayered structure or a protective layer for the circuitry.

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Claims 51-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over (a) JP 10-226,803 in combination with Sterett et al. (5,746,844) or (b) Orme-Marmerelis et al. (6,520,402) in combination with Sterett et al. (5,746,844) further in combination with JP 10-226,803 still further in combination with JP 11-040937.

Features described above concerning references (a) JP 10-226,803 in combination with Sterett et al. (5,746,844) or (b) Orme-Marmerelis et al. (6,520,402) in combination with Sterett et al. (5,746,844) further in combination with JP 10-226,803 are incorporated here.

(a) JP 10-226,803 in combination with Sterett et al. (5,746,844) or (b) Orme-Marmerelis et al. (6,520,402) in combination with Sterett et al. (5,746,844) further in combination with JP 10-226,803 fail to specifically teach using compressed air for jetting the molten metal and using a mask to deposit the molten metal on a desired location of the substrate.

JP 11-040937 teaches injecting compressed gas in a pot of molten solder to jet the solder through a mask and onto a substrate (abstract).

Therefore it would have been obvious for one skilled in the art at the time the invention was made to have modified (a) JP 10-226,803 in combination with Sterett et al. (5,746,844) or (b) Orme-Marmerelis et al. (6,520,402) in combination with Sterett et al. (5,746,844) further in combination with JP 10-226,803 process by incorporating a compressed gas to aid in the jetting of molten metal as well as the use of a mask to provide a desired pattern as evidenced by JP 11-040937.

While the Examiner acknowledges the fact that JP 11-040937 teaches molten metal whereas the instant claims are directed toward a molten metal for circuitry, it is the Examiner's position that the process disclosed is not limited to the material utilized. In fact, one skilled in

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the art at the time the invention was made would have had a reasonable expectation of achieving similar results with any molten “material”.

***Response to Amendment***

7. Applicant's arguments filed 4/16/09 have been fully considered but they are not persuasive.

Applicant argued that the prior art failed to teach or fairly suggest that the three dimensional data is “prepared in the machine” and not calculated by a monitoring device as is done in Kudoh et al. (4,656,048).

The Examiner agrees and has withdrawn the Kudoh et al. (4,656,048) reference however, JP 10-226,803 teaches that the three dimensional data can be set in a storing means (60) or calculated and then compared to the monitored three dimensional data and adjusted to the desired values ([0010]-[0011]). Therefore the limitation is met by the reference as it teaches setting the value in the machine or calculating them prior to comparing and making adjustments dependent upon the desired product produced.

Applicant argued that the prior art teaches a second set of three dimensional data that is only changed in the Z-direction (away from the substrate) and not in a “three dimensional data”, i.e. X,Y and Z.



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The Examiner agrees in part. While the only dimension that is adjusted is the Z-direction, the X-direction and Y-direction are also being changed as the nozzle is moved across the substrate in the X-direction and moved back and forth in the Y-direction to produce the “pyramid” shape product. Furthermore, the claims do not require that the X1,Y1,Z1 and the X2,Y2,Z2 values to be different and therefore the scenario where the X1,Y1 and X2,Y2 are kept constant still meets the claimed invention.

Furthermore, it is the Examiner’s position that the applied indeed teach movement in the X-axis,Y-axis and Z-axis. Orme-Marmerelis et al. (6,520,402) (Figs. 3A,3B and col. 7, lines 18-23), Sterett et al. (5,746,844) (col. 8, lines 11-40), Kudoh et al. (4,656,048) (col. 4, line 47-col. 5, line 20 and Fig. 14) and Pan (6,501,663) (Fig. 19 and col. 12, line 18 – col. 13, line 13) all teach movement of the substrate or coating nozzle in various X-axis ,Y-axis and Z-axis movement to produce three-dimensional coatings.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian K. Talbot whose telephone number is (571) 272-1428. The examiner can normally be reached on Monday-Friday 6AM-3PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Timothy H. Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Brian K Talbot/  
Primary Examiner, Art Unit 1792

BKT